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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/635,956	08/07/2003	Sudarshan Paul Dev	486P009419-US(C01)	1214
2512	7590	09/21/2004	EXAMINER	
PERMAN & GREEN 425 POST ROAD FAIRFIELD, CT 06824			KIM, TAE JUN	
			ART UNIT	PAPER NUMBER
			3746	

DATE MAILED: 09/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/635,956

Applicant(s)

DEV, SUDARSHAN PAUL

Examiner

Ted Kim

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07/29/2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-16, 27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16 and 27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 08/07/2003.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election filed 07/29/2004 is noted. Due to all the remaining claims reading on the elected species the restriction requirement is hereby withdrawn as being moot. However, the Examiner reserves the right to reimpose the restriction requirement if applicant's claims do not remain generic.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 10, 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Dee (3,635,577). Dee teaches a gas turbine engine comprising: an outer casing; a first rotor C: 26, 27, 25, 24 located in the outer casing; and a second rotor D: 26, 27, 25, 24 located in the outer casing; wherein the first rotor has a first compression portion 25 and a first turbine portion 27, the first compression portion substantially surrounding the turbine portion of the first rotor, and wherein the first rotor has an exo-skeletal arrangement with an outer support ring (either 24 or 26) retaining blades of at least one of the first compression portion or the first turbine portion.

4. Claims 10, 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Wilde (3,363,419). Wilde teaches a gas turbine engine comprising: an outer casing; a first rotor

13', 30 located in the outer casing; and a second rotor 14', 32 located in the outer casing; wherein the first rotor has a first compression portion 30 and a first turbine portion 13', the first compression portion substantially surrounding the turbine portion of the first rotor, and wherein the first rotor has an exo-skeletal arrangement with an outer support ring 34 retaining blades of at least one of the first compression portion or the first turbine portion. Note that the fan blades 30, 32 performs compression as is well known in the art and as evidenced by the following definition from the Encyclopedia Britannica:

“ Medium-bypass turbofans, high-bypass turbofans, and ultrahigh-bypass engines

Moving up in the spectrum of flight speeds to the transonic regime—Mach numbers from 0.75 to 0.9—the most common engine configurations are turbofan engines, such as those shown in Figures 4 and 5. In a turbofan, only a part of the gas horsepower generated by the core is extracted to drive a propulsor, which usually consists of a single low-pressure-ratio, shrouded turbocompression stage. The **fan** is generally placed in front of the core inlet so that the air entering the core *first passes through the fan and is partially compressed by it*. Most of the air, however, bypasses the core (hence the designation bypass stream) and goes directly to an exhaust nozzle. The core stream, with some modest fraction of the gas horsepower remaining (not extracted to drive the fan) proceeds directly to its own exhaust nozzle.”

5. Claims 10-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Lifka (5,014,508). Lifka teaches a gas turbine engine comprising: an outer casing; a first rotor 11 located in the outer casing; and a second rotor 12 located in the outer casing; wherein the first rotor has a first compression portion and a first turbine portion, the first compression portion substantially surrounding the turbine portion of the first rotor, and wherein the first rotor has an exo-skeletal arrangement with an outer support ring retaining blades of at least one of the first compression portion or the first turbine portion. The first rotor 11 and second rotor 12 define a compressor section of the turbine engine, a turbine section of the turbine engine, and a combustion chamber section 4 of the turbine

engine, and wherein the combustion chamber section is surrounded by the turbine section 9, and the turbine section 9 is surrounded by the compressor section 11-13.

*Claim Rejections - 35 USC § 103*

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 7-12, 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (5,241,815) in view of any of Box et al (6,374,592), Reichard et al (4,286,431) and Stram, Jr. et al (3,124,933). Lee et al teach an air breathing gas turbine engine comprising: a combustion chamber section 3; a turbine section 8 surrounding the combustion chamber section 3 so that at least part of the combustion chamber section is nested within the turbine section; a compressor section 4 surrounding the turbine section so that at least part of the turbine section is nested within the compressor section. Lee et al do not teach a starter cartridge connected to the combustion chamber section for feeding gases into the combustion chamber section, wherein the starter cartridge has a base shaped to define a toroidal region of the combustion chamber section. Box et al teach a starter cartridge 50, 52 of solid propellant in the combustor for starting the turbine. Reichard et al teach starter cartridges A, B, and C (threaded/positioned in an opening) inside the combustor for starting. Stram, Jr. et al teach a starter cartridge 60 (Fig. 4) threaded/positioned in an opening in the combustor for starting the turbine. Each

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of the starter cartridges when inserted into the combustor defines a toroidal region inside the combustion chamber. It would have been obvious to one of ordinary skill, to employ a starter cartridge in the combustor as a well known means for starting/igniting the combustion and/or turbine operation. Note that there is already a recirculation zone defined within the combustor of Lee et al and it would have been within the ordinary skill in the art to place or thread the starter cartridge in the recirculation zone, as an obvious matter of finding the workable locations in the art. The rotor of Lee has a first and second compressor stage and first and second turbine stage, hence because the rotor is integrally

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formed in stages it can also be considered a first and second rotor.

**United States Patent** [19]  
**Lee et al.**

[11] Patent Number: **5,241,815**  
 [45] Date of Patent: **Sep. 7, 1993**

[54] **HEAT-RECOVERING-THRUST-TURBINE  
 HAVING ROTATIONAL FLOW PATH**

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[21] Appl. No.: **872,915**

[22] Filed: **Apr. 22, 1992**

[51] Int. Cl.<sup>3</sup> ..... **F02C 3/045; F02C 7/10**

[52] U.S. Cl. .... **60/39,43; 60/39,511;**

[58] Field of Search ..... **60/39,35, 39,36, 39,43,**

..... **60/39,511, 39,75, 269; 415/74, 87**

[56] **References Cited**

**U.S. PATENT DOCUMENTS**

2,589,239 3/1952 Fallon ..... 60/39,75  
 2,611,241 9/1952 Schultz ..... 60/39,43  
 3,269,120 8/1966 Sabatini ..... 60/39,75

3,635,577 1/1972 Dec ..... 415/79

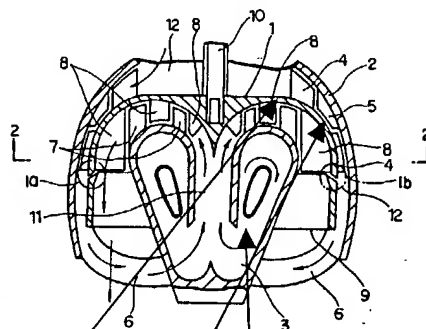
*Primary Examiner*—**Louis J. Casaregola**  
*Attorney, Agent, or Firm*—**Vidas, Arrett & Steinkraus**

[57] **ABSTRACT**

A heat-recovering-thrust-turbine including the rotational flow path has been invented in present work. This thrust turbine consists of a rotating disc having unique shape and functions of compressor and turbine together, a combustion chamber, manifolds for heat recovering and a divergent nozzle having the curved flow path in a different way of conventional gas turbine engines utilizing a straight discharging mechanism of the exhaust gases.

Thus, this invented thrust turbine is able to perform the combined function such as compression of air, cooling of the hot section, recovery of the wasted heats and generation of the thrust and the turbine power being used for the air compression, simultaneously.

**6 Claims, 4 Drawing Sheets**



First rotor    second rotor    recirculation zone

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Furthermore, the first and second rotor has an exo-skeletal arrangement with an outer support ring retaining blades of the first and second turbine portion. The first turbine portion blades have a free inner edge.

8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al as applied above, and further in view of either Karlby et al (2,784,551) or Price (2,579,049). Lee et al teach various aspects of the claimed invention but do not teach the first rotor has a fuel feed surface disposed so that fuel is centrifuged into the air. Karlby et al teach a compressor rotor with a fuel feed surface 237, 235 disposed so that fuel is centrifuged into the air as the rotor turns. Price also teaches a compressor rotor has a fuel feed surface 75 from 76 disposed so that fuel is centrifuged into the air (col. 8, lines 53+). It would have been obvious to one of ordinary skill in the art to employ a fuel feed surface disposed in the rotor of Lee so that fuel is centrifuged into the air, as a well known equivalent technique of injection fuel and one that can eliminate the separate use of a fuel pressurization system.

9. Claims 14, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over any of Lee, Dee, Wilde, and Lifka as applied above, and further in view of any of Blessing et al (4,969,326), Angus (4,786,347) and Griffin (5,273,401). The applied art teaches various aspects of the claimed invention but does not teach a rotor blade having an outer support ring that is fiber reinforced by circumferential filaments. Blessing et al teach a rotor blade having an outer support ring 44 that is fiber reinforced by circumferential filaments. Angus teaches a rotor blade having an outer support ring 16 that is fiber

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reinforced by circumferential filaments. Griffin teaches a rotor blade having an outer support ring 18 that is fiber reinforced by circumferential filaments. It would have been obvious to one of ordinary skill in the art to fiber reinforce the outer support ring by circumferential filaments in order to strengthen and/or prolong its life.

10. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lifka as applied above, and further in view of Dee. Lifka teaches various aspects of the claimed invention including a compressor section surrounding the turbine but does not teach another outer support ring. Dee teaches plural support rings 24, 26 for his combined compressor/turbine rotors where the support rings strengthen the assembly and/or reduce leakage past the blades. It would have been obvious to one of ordinary skill in the art to use another outer support ring in order to strengthen the assembly and/or reduce leakage past the blades.

11. Claims 7, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lifka as applied above, and further in view of any of Box et al (6,374,592), Reichard et al (4,286,431) and Stram, Jr. et al (3,124,933). Lifka teaches various aspects of the claimed invention but do not teach do not teach a starter cartridge connected to the combustion chamber section for feeding gases into the combustion chamber section, wherein the starter cartridge has a base shaped to define a toroidal region of the combustion chamber section. Box et al teach a starter cartridge 50, 52 of solid propellant in the combustor for starting the turbine. Reichard et al teach starter cartridges A, B, and C (threaded/positioned in an opening) inside the combustor for starting. Stram, Jr. et al

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teach a starter cartridge 60 (Fig. 4) threaded/positioned in an opening in the combustor for starting the turbine. Each of the starter cartridges when inserted into the combustor defines a toroidal region inside the combustion chamber. It would have been obvious to one of ordinary skill, to employ a starter cartridge in the combustor as a well known means for starting/igniting the combustion and/or turbine operation.

### *Double Patenting*

12. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

13. Claims 1-9 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-72 of U.S. Patent No. 6,647,707 in view of any of Box et al (6,374,592), Reichard et al (4,286,431) and Stram, Jr. et al (3,124,933). Claim 1 of U.S. Patent No. 6,647,707 appears to match claim 1 of the instant invention with the exception of the language directed to the starter cartridge in the combustion chamber section. Claims 2 and 7 of the instant application are obvious variants of claim 1 and other claims of U.S. Patent No. 6,647,707 with the exception of

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the starter cartridge in the combustion chamber section and having a base shaped to define a toroidal region of the combustion chamber section. Note that elimination of any of the narrow claims of the patent is within the ordinary skill in the art. Reichard et al teach starter cartridges A, B, and C (threaded/positioned in an opening) inside the combustor for starting. Stram, Jr. et al teach a starter cartridge 60 (Fig. 4) threaded/positioned in an opening in the combustor for starting the turbine. Each of the starter cartridges when inserted into the combustor defines a toroidal region inside the combustion chamber. It would have been obvious to one of ordinary skill, to employ a starter cartridge in the combustor as a well known means for starting/igniting the combustion and/or turbine operation. As is well known in the art, the swirl 42 of Box et al will inherently cause recirculation within the combustor and so the starter cartridge will inherently be in a recirculation zone.

14. Claims 10-14, 27 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-72 of U.S. Patent No. 6,647,707 in view of any of Blessing et al (4,969,326), Angus (4,786,347) and Griffin (5,273,401). Claims 14-16 of the patent claim the inner ring/shroud including the reinforcement strands. Not specifically claimed are fibers and filaments though strands may be considered an equivalent term. Blessing et al teach a rotor blade having an outer support ring 44 that is fiber reinforced by circumferential filaments. Angus teaches a rotor blade having an outer support ring 16 that is fiber reinforced by circumferential filaments. Griffin teaches a rotor blade having an outer support ring 18 that is fiber

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reinforced by circumferential filaments. It would have been obvious to one of ordinary skill in the art to fiber reinforce the outer support ring by circumferential filaments in order to strengthen and/or prolong its life. As for applying the strands to the shroud/ring of the second rotor, this would have also been obvious to fiber reinforce the second rotor ring/shroud by circumferential filaments in order to strengthen and/or prolong its life.

15. Claims 15, 16 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-72 of U.S. Patent No. 6,647,707 in view of any of Blessing et al (4,969,326), Angus (4,786,347) and Griffin (5,273,401) as applied above and further in view of either Dee or Lee et al. The additional outer ring is not claimed in the patent nor the first turbine portion having a free inner edge. Dee teaches plural support rings 24, 26 for his combined compressor/turbine rotors where the support rings strengthen the assembly and/or reduce leakage past the blades. It would have been obvious to one of ordinary skill in the art to use another outer support ring in order to strengthen the assembly and/or reduce leakage past the blades. Lee et al teach having a free inner edge to the turbine. It would have been obvious to incorporate a free inner edge as a well known turbine configuration used in the art.

#### ***Contact Information***

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Ted Kim whose telephone number is 703-308-2631. The Examiner can be reached on regular business hours before 5:00 pm, Monday to Thursday and every other Friday.

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The fax numbers for the organization where this application is assigned are


703-872-9306 for Regular faxes and 703-872-9306 for After Final faxes.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Justine Yu, can be reached on 703-308-2675.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist of Technology Center 3700, whose telephone number is 703-308-0861.

General inquiries can also be directed to Technology Center Customer Service Office at 703-306-5648 or the Patents Assistance Center whose telephone number is 800-786-9199. Furthermore, a variety of online resources are available at

<http://www.uspto.gov/main/patents.htm>



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